

REMARKS

Claims 1 and 2 are pending in the Application, with Claim 2 being withdrawn from consideration. Favorable reconsideration is respectfully requested in light of the following Remarks.

Applicant wishes to thank the Examiner for the telephonic interview conducted with Applicant's Representative Kerstin Brandt on April 6, 2004.

Claim 1 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Karande et al. (U.S. Patent No. 5,717,000) in view of Christiani et al. (U.S. Patent No. 5,747,560) as evidenced by Claytone Chemistry. Christiani et al. teaches that aggregate particles can still constitute nanoscale and nanodispersed fillers as long as they are less than about 10 layers thick and preferably less than 5 layers thick.

Claim 1 is amended in a manner to exclude the range disclosed in Christiani et al. to overcome the obviousness rejection. Amended claim 1 defines "that at least some of the reinforcing particles are not completely exfoliated and are from about 11 to about 30 layers thick", to more clearly distinguish the present invention from the prior art of record.

As explained in the previous responses and in accordance with the invention, exfoliation of the layered mineral particles into constituent layers does not need to be as complete as the references of record require. Specifically, claim 1 recites that at least some of the reinforcing particles are from about 11 to about 30 layers thick. Support for this amendment can be found in the other claim limitations and in the specification as originally filed. The specification as originally filed states that the exfoliation of layered mineral particles does not need to be complete (p. 8, lines 1-6). Further, claim 1 as originally filed recites that more than about 99% of the reinforcing particles are less than about 30 layers thick. In other words, at least some of the reinforcing particles are from about 11 to about 30 layers thick, since the exfoliation of the layered mineral particles does not need to be complete.

The prior art of record requires that the reinforcing particles are exfoliated and not more than up to about 10 layers thick. It is generally accepted in the prior art that the preparation of

nanocomposites requires extensive delamination of the layered clay structure and complete dispersion of the resulting platelets throughout the polymer matrix. Thus, in accordance with the prior art, an exfoliated nanocomposite, wherein the layered mineral swells so much that it is no longer organized into stacks, is the most desirable structure. Therefore, the prior art discloses methods to improve exfoliation to achieve complete or almost complete exfoliation. However, usually very strong electrostatic interactions between silicate layers through intergallery cations make it extremely difficult to achieve complete exfoliation of the layers. Therefore, the prior art discloses efforts to avoid this difficulty and to achieve complete exfoliation of the particles through the development of a compatibilizer chemistry as a key factor in the expansion of this nanotechnology, for example, by replacing such cations by some quarternized ammonium salts.

The Claytone Chemistry article was discussed in a more detailed manner in the previous response. The teaching of this article provides further support for prior art efforts that exfoliation and dispersion of clay platelets during nanocomposite preparation and clay matrix adhesion are major technical issues that need to be addressed in order to achieve the desired property enhancements in polymer-clay nanocomposites. However, the article provides no disclosure that the exfoliation of the layered mineral particles into constituent or single layers/platelets does not need to be complete in order to achieve the objects of the present invention

In accordance with the instant invention, exfoliation of the layered mineral particles does not need to be as complete as the references of record require. Consistent with this greater tolerance for larger particles, claim 1 is amended to specify that at least some reinforcing particles are from about 11 to about 30 layers thick, which is attributable to those particles not being completely exfoliated. None of the references of record teach or suggest particles of that size as being permissible. Furthermore, the prior art does not provide any motivation to provide reinforcing particles in which the exfoliation is not complete. Thus, the present invention provides advantages over the prior art since it reduces the efforts in achieving a complete or nearly complete exfoliation of the layered mineral particles and hence it reduces the time and cost of providing reinforcing particles.

Applicant acknowledges that the Office Action mailed on January 29, 2004 states that the art rejections over Karande et al. in view of Okada et al. as evidenced by Claytone Chemistry have been overcome by the arguments and amendment filed on October 21, 2003.

Furthermore, Applicant acknowledges that the Office Action mailed on June 24, 2003 states that the art rejections over Karande et al. in view of Christiani et al. have been overcome by the arguments filed on June 4, 2003.

Applicant submits that the above Amendment places this case in condition for Allowance, and a holding to this effect is respectfully solicited. If however, the Examiner believes that any issue remains, she is requested to call Applicant's undersigned attorney of record so that a brief interview may be arranged for resolving any such remaining issue.

Please charge any fees associated with the submission of this paper to Deposit Account Number 033975. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,

PILLSBURY WINTHROP LLP



KENNETH M. FAGIN
Reg. No. 37,615
Tel. No. (703) 905-2066
Fax No. 703 905-2500

Date: June 1, 2004
P.O. Box 10500
McLean, VA 22102
(703) 905-2000